from inwards, sufficient ground only being available outside for "a long pull and a strong pull."

In former notes I have referred to Mr. Cunnington's remarks on the remains of the syenite trilithon, and his suggestion that it formed part of an older temple. He expressed the view that the structure of Stonehenge as we know it with its trilithons was, in fact, suggested by it.

Now if we attempt to find the place it occupied before it fell by seeing where it would be most symmetrically placed in relation to the adjacent stones of the blue stone circles still standing, we are led to an interesting result. Using the old centre as determined from the N.W. and S.E. stones we find that the May sunrise would be seen through the small syenite trilithon. In this way also we can account for the fact that so far as is known this is the only trilithon which existed in the old blue stone circle; it may well have been that the centre and diameter of the new blue stone circle were so regulated as to retain it in position; I have already remarked that this was done in the case of the older unhewn sarsens, as a memorial of the past.

NORMAN LOCKYER.

THE APPROACHING TOTAL SOLAR ECLIPSE OF AUGUST 30.

THERE are many special features about the total solar eclipse of August of the present year. In the first place, perhaps the chief of these is that it will occur about the time when the solar atmosphere is greatly disturbed, or in other words, at a time when the number of sun-spots is about a maximum. Second, the localities from which it may be observed are well distributed over land surfaces, and some are easily accessible from the British Isles. Thirdly, observers will have to wait many years before another favourable eclipse occurs. That in 1907 will be visible in Central Asia, but its occurrence in January will deter many from seeing it. The two eclipses in 1908 will be visible only from the Pacific and South Atlantic. The eclipse of 1909 will occur in June in Greenland, while that in 1910 will be visible only from the Antarctic regions. In 1911 only a short portion of the end of the eclipse track will pass through a part of South Australia. It is therefore the eclipse of 1912, that will take place in April in Spain, which will be the next easily accessible one to observe; but as totality will only last 60 seconds, its duration will be brief compared with that of this year, which will last for more than 3½ minutes.

Further, the fact that the approaching eclipse occurs in a month, such as August, when a great number of people are taking their summer holiday, and therefore can more easily leave these shores, should ensure the presence of many volunteer observers at the more easily reached stations. In the present instance the zone of totality commences in Canada towards the south of Lake Winnipeg, skirts the extreme south of Hudson's Bay, passes a little to the north of Nova Scotia, and then crosses the Atlantic. In Europe it strikes Spain (Fig. 1) on its north-west coast line, and leaves the eastern coast, enveloping the islands of Majorca and Iviza. Reaching Africa in the neighbourhood of eastern Algeria (Fig. 2), it passes through Tunis, Tripoli, Egypt, and the Red Sea, and finally terminates in Arabia.

In Spain an opportunity is afforded of making observations at some stations of high altitude, for the eclipse track includes several lofty mountains. For instance, Penas de Europa, south-west of Santander, and 8000 feet high, is one of numerous possible observing peaks, and advantage should be taken of this or some other elevated region.

It will thus be seen that there is plenty of scope for observers to scatter themselves along the line of totality, and this should be done as much as possible. The low altitude of the sun during totality at Labrador (27°) and Egypt (24°) renders both these regions somewhat unfavourable for the best observations, but there parties should at any rate be present. The former region can undoubtedly be left to Canadian and American observers, for it does not seem necessary that European observers should journey so far when more favourable stations are nearer at hand. The close proximity of Egypt to many European countries renders this part of the zone of totality easily accessible. Here the central line of totality passes just a little north of Assuan, the outer limits enclosing Edfu on the north and Darmut on the south.

The probable weather conditions at the different stations form an important item in eclipse matters, for clouds can easily mar the work of even the best organised expedition. Omitting Labrador, a station that will not be occupied by observers from this country, the north-western portion of Spain does not seem to be particularly favoured with the required weather conditions. According to Señor F. Iñiguez, the director of the Astronomical and Meteorological Observatory of Madrid, this locality during August is not only cloudy and damp, but storms are of frequent occurrence. Such a report, however, should not prevent one party at least from taking up a position there, but it should suggest to many who had up to the present made up their minds to observe in that locality to seek stations further along the line, and not congregate at a very probably unfavourable station such as this appears to be. At stations towards the east the conditions seem to be more suitable the closer the Mediterranean side is approached, and, according to the authority mentioned above, the probability of fine weather on this coast is very high. Inland stations will probably have the disadvantages of dust and heat combined.

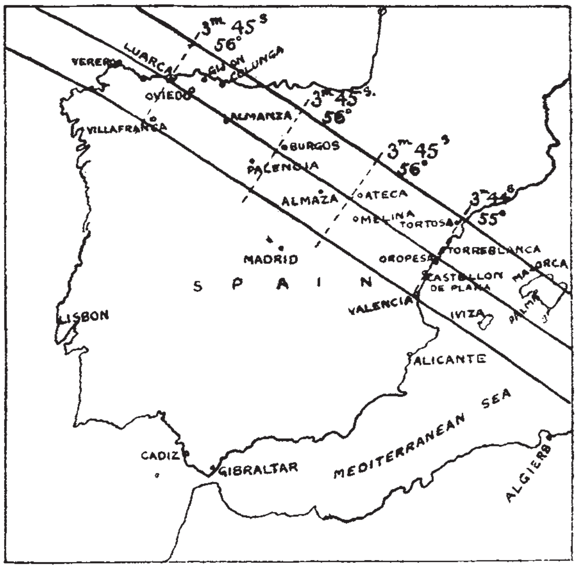

FIG. 1.—The path of totality across Spain. The duration of totality and the altitude of the sun at that time are given for four different stations along the line.

Perhaps one advantage of the north-west over the east coast is that the former will be very much the cooler, but in eclipse matters sky conditions precede temperature considerations.

With regard to such matters as suitable sites for instruments, their safety, guards for camps, building materials, &c., the Spanish Government can be depended upon to render every assistance to those who apply through the proper channels, and the valuable aid they gave to parties during the eclipse of 1900 is still in the memory of many observers.

Those who wish to know something about the routes to Spain, the methods of travel and approximate cost, will find some interesting and useful information in an article recently writen by Mr. G. F. Chambers, and published in the *Journal* of the British Astronomical Asociation (vol. xv., No. 2, p. 93). Another source of information specially useful to those visiting Spain is a publication just received from the Astronomical Observatory of Madrid, entitled "Memoria sobre el Eclipse Total de Sol del dia 30 de Agosto de 1905." This has been prepared by the director, Señor Francisco Iniguez, and contains details about climate and many useful maps, in addition to data about the eclipse itself.

The weather conditions for the stations situated in Algeria, Tunis, and Tripoli seem to be very favourable, and should be made the most of. For Algeria, and more especially for the neighbourhood of Philippeville, we have some useful facts which have been communicated through M. Mascart by M. A. Angot, of the Bureau Central Météorologique, Paris. Dealing first with cloud and rain, we learn that during the months of July and August Philippeville is the clearest and driest of all the coast stations in Algeria, the mean rainfall for these months amounting to 4 and 10 millimetres respectively out of a total of 807 millimetres for the whole year. The average number of rainy days for each month totals two or three. Storms are rare, but increase towards the interior. If we represent clear sky by 0 and sky covered by 10, then 2 or 3 would represent the condition of cloudiness at Philippeville.

As regards temperature, the diurnal variation has an amplitude of 9° C. or 10° C., the mean temperature being 24° C. (75° F.). By night the temperature would thus be about 18° C. or 19° C. (64° F. or 66° F.), and at two hours after noon the maximum day temperature would reach 29° C. or 30° C. (84° F. or 86° F.). For stations situated some tens of miles inland there is a very rapid increase of day temperature.

The prevailing winds in August vary from N.E. to N.W., *i.e.* are sea winds; they are not strong, and are not much augmented by the sea breeze.

In Egypt the prospect of fine weather in August is also very great, so that observers who go to that region need not be very anxious, at any rate about clouds.

It is impossible at present to give a full or even final statement regarding the distribution of parties along the line of totality, but the following preliminary, but incomplete, list may be of interest, and indicates not only the regions that will be occupied by most of the British expeditions, but the chief types of observations that are proposed during the brief interval of totality. For the greater part of this information I am indebted to Major E. H. Hills, C.M.G., secretary of the Joint Permanent Eclipse Committee of the Royal Society and Royal Astronomical Society:—

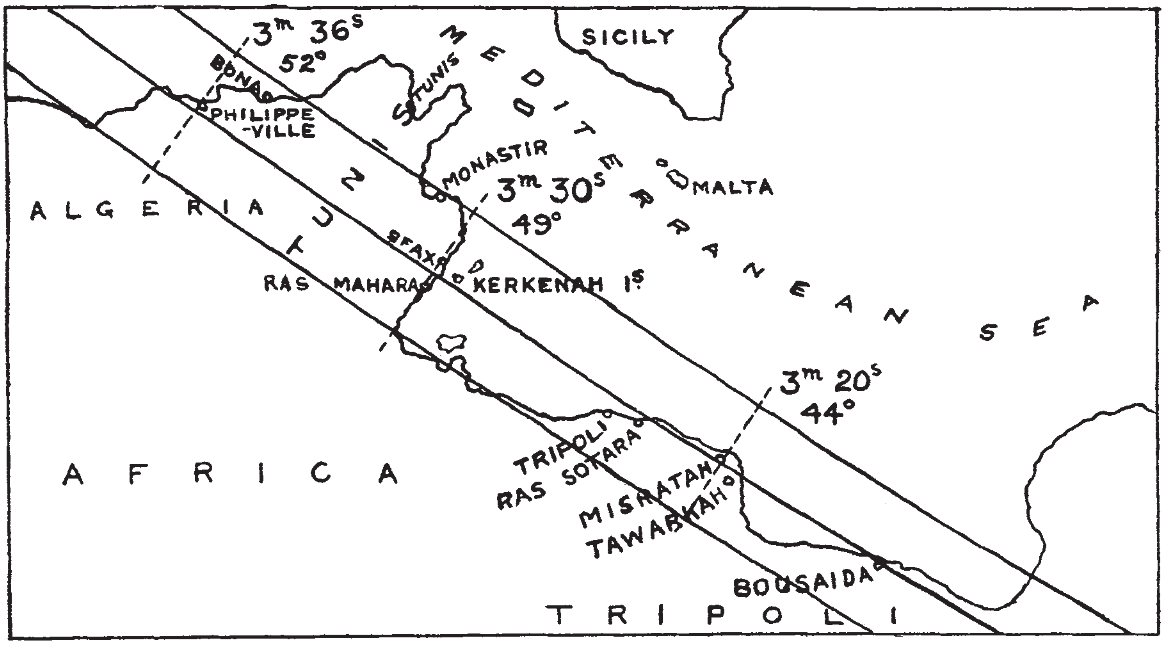

FIG. 2.—The path of the totality track in northern Africa. For three stations the duration of totality and the altitude of the sun during the eclipse are marked on the map.

Labraaor.

Lick Observers	Search for intra-mercurial planets. Large scale corona photographs.
(Canadian parties probably.)	

Spain.

Mr. John Evershed. Near Burgos...	Prismatic reflector photography of chromosphere and corona.

Prof. Callendar Prof. A. Fowler Mr. W. Shackleton	Near Oropesa.	Experiments on coronal radiation. Photography of the red and green regions of the spectrum of the chromosphere and corona.
Lick Observers		Search for intra-mercurial planet. Large scale corona photographs. Polarisation observations. Spectroscopic photographs of chromosphere and corona.
	Algeria.	
Sir Norman Lockyer Dr. W. J. S. Lockyer Mr. C. P. Butler	Near Philippeville	Prismatic camera (three prisms) photographs of chromosphere & corona. Large scale prismatic reflector photographs of chromosphere & corona. Small scale photographs of corona.
Mr. H. F. Newall	Near Bona	Spectroscopic and polariscopic observations.
	Tunis.	
The Astronomer Royal Mr. F. W. Dyson Mr. Davidson	Sfax	Photographs of the corona on 4-inch and 1¼-inch scales. Spectra of chromosphere & corona with Major Hills's spectroscopes.
	Egypt.	
Prof. Turner Mr. Bellamy		Polariscopic observations. Corona photographs with Abney doublet. (Large scale photographs of the corona ?)
Lick Observers		Search for intra-mercurial planets. Large scale corona photographs. Integrating spectroscopic photographs.

One of the novelties that will be attempted during this eclipse will be the photography of the eclipsed sun by means of the three-colour process. The camera that will be employed will probably be one having three lenses, so that the exposures through the three coloured screens can be made simultaneously, the correct ratio of the exposures being obtained by adjusting the apertures of the lenses.

When it is considered that in addition to these parties there will most probably be expeditions from several other countries, such as Spain, Portugal, Holland, France, Germany, Italy, Russia, Egypt, &c., and probably one or two more United States expeditions, there is a great opportunity not only for occupying a large number of different stations along the line, but of gaining a quantity of valuable material to enlarge our knowledge of solar physics.

William J. S. Lockyer.

THE CEYLON PEARL FISHERIES.[1]

LITTLE enough is done by the State in this country in the matter of aiding scientific research, and this is especially true of biological science. To this attitude of indifference, or aloofness, we have grown accustomed; abroad it is a subject for uncomplimentary comment. This attitude cannot be due to the conviction on the part of our ministers that "science is bankrupt," since when some great industry is threatened by injuries which legislation is powerless to check, or some pest is threatening the welfare of the community, the aid of the man of science is at once invoked.

The Pearl Fishery Commission is a striking example of the intervention of the State to aid a crippled industry by calling in the aid of the biologist.

The series of barren years alternating in some mysterious way with years of plenty puzzled those engaged in this fishery for more than two centuries, and, moreover, seriously reduced the profits of the fishing. To fathom this strange uncertainty, and if possible to find means whereby more uniform harvests could be ensured, the Government submitted the matter to a commission of inquiry, which has been held under the auspices of the Ceylon Government. The results of this inquiry have abundantly justified those responsible for its inception, and should do much to establish the advisability of instituting inquiries into other problems to which we could point that can only be dealt with by trained and experienced biologists.

The second part of Prof. Herdman's report to this commission in no wise suffers by comparison with the first volume. It is a very mine of information, yielding rich lodes of fact without the trouble of any preliminary crushing or sifting.

This report opens with a luminous review of the history of the principal fisheries from 1801 to the present time, and should prove of the highest value to those engaged in pearl fishing in future, for the causes of the rise, zenith, and decline of the different fisheries between these dates have been analysed and tabulated.

It is now established beyond doubt that the normal life of the pearl oyster does not average more than five years, and that these, especially to an animal so peacefully disposed as an oyster, are full of catastrophes and rumours of catastrophes!

By way of illustration as to the truth of this, we may well select an instance or so from this report. On the "Kondatchi Paar" in March, 1902, there were about 5,750,000 oysters. By March, 1903, these had been almost entirely wiped out of existence—eaten by starfish! File-fishes and enormous rays also show an insatiable appetite for oysters, and in the course of a few months will devour millions! Not seldom these oysters are smothered or killed by the invasion of hordes of young of their own species. But this is not all. Shifting sands may overwhelm incredible hosts, and millions are swept away by currents.

Man, says Prof. Herdman, "can do comparatively little to mitigate the severity of such influences as tell against the life and prosperity of the Pearl Oyster."

But it is just because he can do so little that there is so great a need of a vigilant and intelligent watch being constantly kept on the different fishing grounds. To a very considerable extent, Prof. Herdman has shown that man can make good these ravages, or snatch the remnant at least of a disappearing host from destruction. His plan is to transplant young oysters from beds known to be dangerous into more sheltered areas. This rescue work is to be further turned to account by using the waifs and strays, which are to be garnered by the inspection vessel, for restocking old beds, where they may grow and thrive—and become infected by the chosen parasite to keep up the growth of pearls of great price!

To ensure this infection is one of the problems which Mr. Hornell, the inspector of fisheries, is to solve.

The life of the pearl oyster is, as we have remarked, about five years, and it is from those of this age that the finest pearls are obtained. Herein lies a danger, since there is always a strong temptation to delay fishing as long as possible to ensure big pearls. Unless, as Prof. Herdman points out, these beds be carefully watched, one of the many catastrophes which attend pearl oysters may carry off this precious crop before

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[1] "Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar." By W. A. Herdman, D.Sc., F.R.S., &c. Part ii. Pp. viii+300. (London: The Royal Society, 1904.)